

Remarks

This application has been reviewed in light of the Office Action dated February 6, 2007. In view of this paper, Claims 18 and 44-80 are now pending in this case, with Claims 18, 47, 52, 61, 67, 73, 76, 79 and 80 in independent form.

Applicants wish to thank the Examiner for discussing the present application with Applicants' undersigned attorney on May 11, 2007.

In this paper, Claims 18, 47 and 52 are amended to call for a reactive multilayer foil having a thickness greater than or equal to 60 μm . Applicants respectfully submit that all pending claims as amended are in condition for allowance.

Claims 53-80 are added by this paper, and are intended to provide the Applicants with a broader scope of protection. No new matter has been added in the new claims. Support for these claims may be found in the present application (with reference to the application as published as U.S. Publication No. 2004/0247931) at least at the following paragraphs [0035], [0037], [0038], [0041], and [0042]. New claims 53-80 are believed to be in condition for allowance in view of the prior art of record in the present application.

The 35 U.S.C. §112 Rejection of Claim 52

In the Office Action, the Examiner sets forth a rejection of Claim 52 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner states that it is unclear "if the applicant is claiming that the *compound* has said heat of formation or if *the reaction* to form the compound has said heat of formation." (Emphasis in the original). The Applicants point out that Claim 52 calls for "a compound having a heat of formation more negative than -30kJ/mol-atom".

Applicants submit that the claim language particularly points out and distinctly claims that it is the compound that has the heat of formation more negative than -30kJ/mol-atom.

The Provisional Obviousness-Type Double Patenting Rejections

In the Office Action, Claims 18 and 44 stand provisionally rejected under obviousness-type double patenting over co-pending U.S. Patent Application No. 10/976,877 in view of U.S. Patent No. 5,381,944 (herein “Makowiecki”). In addition, Claims 18 and 44 stand provisionally rejected under obviousness-type double patenting over co-pending U.S. Patent Application No. 10/898,650 in view of Makowiecki. Because these rejections are provisional in nature, the Applicants wish to defer action in this regard until the provisional status of the rejections is removed. As such, upon indication of allowable subject matter in this or the related applications, the Applicants will file the appropriate terminal disclaimer to obviate the rejection.

The 35 U.S.C. §102(b) Rejection of Claims 18, 47-49, and 52 over Makowiecki

In the Office Action, Claims 18, 47-49 and 52 stand rejected under 35 U.S.C. §102(b) as anticipated by Makowiecki. It is well-established that for a reference to defeat a claim’s novelty under 35 U.S.C. § 102 (i.e., anticipate the claim), it must disclose each and every element of the claim. Advance Display Sys. v. Kent State Univ., 212 F.3d 1272 (Fed. Cir. 2000). Applicants respectfully submit that Makowiecki fails to disclose each and every element of Claims 18 and 44-52, as amended. As such, Applicants request that the rejection be withdrawn, based at least on the reasons set forth in detail below.

Makowiecki teaches a joining technique that involves the reaction of thin multilayered films deposited on faying surfaces to create a stable compound that functions as a intermediate or braze material in order to create a high strength bond. (Makowiecki, Abstract) (Emphasis added). The films are described in Makowiecki as “very thin (1-10 μm for example). (Makowiecki, column 2, lines 52-61). In an example set forth in Column 3, Makowiecki describes the use of a Ti/B multilayer (0.5 - 50 μm). (Makowiecki, column 3, line 65). It should

be noted, however, that this example does not describe a freestanding foil (i.e., a foil having a thickness of greater than or equal to 60 μm), as discussed in detail below.

The bonding process described therein is focused on generating very little heat, a result achieved by using these very thin multilayer films. (Makowiecki, column 2, lines 58-61). In order to use films this size, the thin films are deposited on a faying surface by a vacuum coating process. The support surface or substrate is used to provide the films with rigidity. However, because the thin films are deposited on a faying surface, they are not freestanding.

Claims 18, 47, and 52 as amended call for a bonded structure comprising a reactive multilayer foil having a thickness of greater than or equal to 60 μm . Support for this amendment may be found in the application, as published as U.S. Publication No. 2004/0247931, at least at the following paragraphs [0043] - [0045]. This thickness permits the foils to be freestanding, allowing these foils to overcome problems associated with thermal shock and densification that have presented obstacles in known bonding processes, such as Makowiecki's. These thicker freestanding foils may be used with reaction temperatures that are lower, leading to more stable, less brittle foils which are easier to use in bonding applications. According to the claimed invention, the use of thicker foils results in a stronger, more stable bonded structure.

Non-freestanding foils such as the those described in Makowiecki, on reacting, heat rapidly and expand beyond the faying surface or substrate that constrains them. The negative effects of this expansion are detailed in the following excerpt of the present application:

“This [rapid expansion] leads to a thermal shock and foils that are deposited on substrates can debond, thereby causing inconsistent and less effective bonding. As the reaction proceeds, the foils will also densify, due to the change in chemical bond. This densification, can also cause debonding from a substrate and inconsistent and ineffective bonding. By making the foil freestanding in accordance with a preferred embodiment of the invention, no debonding occurs, the foil is easily manipulated and

handled, and thus the reactive foil is made available to a greater variety of applications.”

(Applicants’ Published Application, paragraph [0044]).

Accordingly, Makowiecki fails to disclose each and every element of the claimed invention, specifically a bonded structure comprising a reactive multilayer foil having a thickness of greater than or equal to 60 μm , as called for in Claims 18 and 44-52. Applicants respectfully request that this rejection be withdrawn and that the claims be placed in condition for allowance.

The §103 Rejection of claims 18, 44-52 based on Makowiecki


In the Office Action, the Examiner sets forth a 35 U.S.C. §103 rejection of Claim 51 based on a combination of Makowiecki and U.S. Patent No. 3,996,402 (herein “Sindt”). In addition, the Examiner sets forth a 35 U.S.C. §103 rejection of Claims 18, 44-50 and 52 based on a combination of Makowiecki and U.S. Patent No. 5,251,803 (herein “Kashiba”). As established above, Makowiecki fails to teach each and every element of the claimed invention, particularly a bonded structure comprising a reactive multilayer foil having a thickness greater than or equal to 60 μm , as called for in amended Claims 18 and 44-52. Furthermore, neither Sindt nor Kashiba teach or describe freestanding foils having the claimed thickness. Therefore, the cited references, Makowiecki, Sindt and Kashiba, considered alone or in combination, fail to teach or suggest all of the claim limitations. Accordingly, based at least on the reasons set forth above, the §103 rejections of Claims 18 and 44-52 should be withdrawn.

In view of the above remarks and amendments, Applicants respectfully submit that Claims 18 and 44-80 are in condition for allowance. Favorable consideration in this regard is earnestly solicited.

All fees associated with entry of this Response have been authorized via the EFS-web system. However, if any additional fees are deemed necessary, the Commissioner is authorized to charge any fees related to the entry of this Reply to Deposit Account Number 501358.

Applicants' undersigned attorney may be reached by telephone at (973) 597-2500. All correspondence should continue to be directed to our address listed below.

Respectfully submitted,

A handwritten signature in cursive script, reading "Daniel D. Sierchio".

Daniel D. Sierchio

Reg. No. 53,591

Attorney for Applicants

Lowenstein Sandler PC
Docket Administrator
65 Livingston Avenue
Roseland, NJ 07068